Laser Systems

Below, a technician is mounting a laser at Laser Analytics Division of Spectra-Physics, Bedford, Massachusetts. Laser Analytics produces high reliability laser systems for scientific and industrial use, including tunable diode lasers (TDLs) typically employed as radiation sources in high resolution infrared spectroscopy to determine or monitor the spectral characteristics of gaseous compounds. The lower photo exemplifies the use of a Laser Analytics product; it shows a TDL-based system for monitoring the core of a commercial gas-cooled nuclear power reactor at the Central Electricity Generating Board, Hartlepool, England. Other examples of TDL applications include a monitor for production of quartz halogen lamps at GTE Sylvania, Winchester, Kentucky and a system for monitoring chemical processes in manufacture of vulcanized silicone rubber sealant at General Electric Company's Silicone Products Division, Waterford, New York.

Laser Analytics credits the high reliability of its TDLs to a laser improvement program in the latter 1970s funded by Langley Research Center. Prior to that program, the company's TDLs were characterized by adequate performance but severe reliability problems. The Langley-sponsored program involved extensive experiments to determine the cause of TDL degradation. The research effort uncovered the fact that TDL degradation, which occurred during room temperature storage of the device, was associated with a phenomenon known as "intermetallic diffusion," a reaction between the lead-salt laser crystals and the metallic layers applied as contacts. This discovery led to an advanced metallization process that enabled laser shelf-life reliability values of more than five years. Laser Analytics says that the improvement in product reliability enhanced the company's competitive position and expanded sales of both scientific and industrial systems.